CLAIMS

1. A method of manufacturing a field electron emission cathode having at least one cathode electrode which comprises a field emitting layer (302) between first and second conducting layers (301, 303), and at least one gate electrode which overlies said cathode electrode and comprises an insulating layer (304) and a third conducting layer (305), characterised in that said method comprises the steps of:

a. depositing on an insulating substrate (300) to form by low resolution means, a sequence of said first conducting layer (301), field emitting layer (302) and second conducting layer (303) to form said at least one cathode electrode;

b. depositing on said cathode electrode to form by low resolution means, a sequence of said insulating layer (304) and third conducting layer (305), to form said at least one gate electrode;

c. coating the structure thus formed with a photoresist layer (306);

d. exposing said photoresist layer (306) by high resolution means to form at least one group of emitting cells, the or each said group being located in an area of overlap between one said cathode electrode and one said gate electrode;

e. etching sequentially said third conducting layer (304), said insulating layer (304) and said second conducting layer (303) to expose said field emitting layer (302) in said cells; and

f. removing remaining areas of said photoresist layer (306).

2. A method according to claim 1, wherein said cathode is a cathode array, said cathode electrode and said gate electrode comprise respectively cathode addressing tracks and gate addressing tracks, which tracks are

arranged in addressable rows and columns, and step d. includes forming a pattern of said groups of emitting cells.

3. A method according to claim 2, wherein at least one of or all of said cathode addressing tracks address(es) a plurality of rows or columns of cells.

4. A method according to claim 2 ~~or 3~~, wherein said steps of exposing and etching include the formation of fiducial marks (432) on the cathode array, to facilitate the subsequent alignment of the array with an anode or other component after manufacture of the array.

5. A method according to ~~any of the preceding claims~~ claim 1, comprising the step of forming at least one of said conducting layers (301, 303, 305) by application of a liquid bright metal or by electroless plating.

6. A method according to ~~any of the preceding claims~~ claim 1, comprising the step of forming at least one of said conducting layers (301, 303, 305) by a means other than vacuum evaporation or sputtering.

7. A method according to ~~any of the preceding claims~~ claim 1, wherein said field emitting layer (302) comprises a layer of broad area field emitter material.

8. A method according to ~~any of the preceding claims~~ claim 1, comprising the further steps of depositing sequentially a second insulating layer (606) and fourth conducting layer (607) onto the cathode after completion of steps a. to f., to form a focus grid.

9. A field electron emission cathode which has been manufactured by a method according to ~~any of the preceding claims~~ claim 1.

A1 10. A field emission device comprising an anode having electroluminescent phosphors (613) and a cathode according to ~~claim 9~~, wherein the cathode is a cathode array in ~~accordance~~ with claim 2 and is arranged to bombard said ~~phosphors~~ (613).

11. A field emission device according to claim 10, wherein said phosphors (812) are arranged in groups of red, green and blue to form a colour display.

12. A field emission device according to claim 11, including anode driving means (804, 805, 806) for energising said red, green and blue groups in turn.

a 13. A field emission device according to claim 10, ~~11 or 12,~~ further comprising an electrode (813) of interdigitate or mesh form which is interposed between said phosphors (812) and is arranged to be driven at a potential less than that at which said phosphors (812) are driven, thereby to form potential wells around the phosphors in order to attract electrons (816) towards said phosphors (812) and compensate for any misalignment between cathode and anode.

a 14. A field emission device according to claim 9 ~~any of claims 9 to 13~~, wherein said cathode is provided with a further control grid over said gate electrode, and a driving means for so driving said control grid as to retard electrons emitted by the cathode.

15. A field emission device according to claim 14, further comprising means for providing a magnetic field normal to the emitter surface.

1,126 16 ~~18.~~ A field emission device substantially as hereinbefore described with reference to Figure 6a, Figure 6b, Figure 7, Figure 8a or Figure 8b of the accompanying drawings.